"Does Head Start Yield Long-Term Benefits?"

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Recent work in developmental psychology indicates that the development of cognitive and non-cognitive (i.e. motivation) skills during the preschool years can have large effects on later success or failure in school.[1] Success in school then impacts success in the labor market. In addition, Heckman (1999) argues that investments in disadvantaged children are superior to investments in low-skill adults since the rate of return on investments in the children is higher because less human capital has been invested in them and the time-horizon over which returns will accrue is longer for the children.

These arguments would seem to imply that Head Start, a program that attempts to improve cognitive and social skills and the health of disadvantaged children, would bring long-term gains to its participants. However, the evidence on whether Head Start has long-term benefits for participants is inconclusive.

A majority of the Head Start studies have examined whether the program affects the IQ's of its participants. The evidence indicates that initially the participants' IQ's are raised, but that the positive effects fade and are entirely gone by the time the children reach eight or nine years of age. However, Head Start may lead to academic and life success by affecting outcomes other than IQ.

Most of the evidence that is used to argue that Head Start affects outcome other than IQ use data from model preschool programs as opposed to Head Start. These model programs include the Perry Preschool Project, the Early Tennessee Training Project, and the Abecedarian Project. In general, these studies indicate that compensatory preschool is associated with fewer grade repetitions, fewer arrests, lower high school dropout rates, and greater cognitive attainment.

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[1] For examples, see Burchinal et al. (1997), Campbell and Ramey (1994).

These programs differ from Head Start in that they were funded at higher levels, intervened in the participants home environments more intensively, had better trained staffs, and lower student-staff ratios. Consequently, the findings based on these projects may not generalize to Head Start. Moreover, the studies of these programs rely on small sample sizes and tend not to correct for observable characteristics of the youth or account for sample selection.

Studies of these projects tend to examine differences in mean or correlations between program attendance and outcomes. Many of these studies account for neither observable nor unobservable characteristics of the participants. For example, Sweinhart et al. (1993) compares children who participated in the Perry Preschool Project to their counterparts who were not participants. At age 27, the participants had higher earnings, higher educational attainment, a greater percentage owned homes, a smaller percentage had received government assistance in the past ten years, and had had significantly fewer arrests. However, the result "are based on simple comparisons of the program group and the no-program group without statistical adjustments to compensate for the effects and background covariates" (p. 44).

Examination of the studies of compensatory education programs shows that programs that are long in duration (four years or more) and that are of high-intensity (low student-staff ratios, well-trained staffs) bring significant improvements in the participants' outcomes. Whereas programs that have neither of these attributes tend not to bring long-term benefits to the participants (Ramey and Ramey, 1998; Reynolds, 1994). Head Start is neither long in duration nor intensive.

Using the National Longitudinal Survey of Youth Mother-Child Supplement (NLSY-MCS), Currie and Thomas (1995) are able to correct for many of the issues that are problematic

in other studies of Head Start.[2] They are able to examine explicitly the effects of Head Start on a

variety of child outcomes. The children in their sample must be three or older and have a sibling

who is also in the data set and three or older.[3] They examine four outcomes: scores on the

Peabody Pictorial Vocabulary Test (PPVT), grade retention, immunization, and height-for-age.

Three sets of results are presented. The first examines the relationship between the outcomes

and participation in Head Start without controlling for other variables. The second includes

controls for observed characteristics of the child and his or her mother, and the third controls for

permanent observables and unobservables via a mother fixed-effect, as well as for time-varying

observable characteristics. The results imply that Head Start leads to higher PPVT scores and a

lower incidence of grade retention for white children, but has no significant effect on the

outcomes of black children. While Currie and Thomas (1995) does improve on attempts to

assess whether participation in Head Start carries long-term benefits, the sample of children

considered is still relatively young. The average ages of the white and black children are 8.3 and

9.0 years respectively.

This study uses a new data set that allows one to consider longer-term effects of Head

Start. The youth are between the ages of 12 and 17; thus, they are several years older than those

in Currie and Thomas's sample. In addition, when weighted they comprise a nationally

representative sample of youth in this age range. A broad range of outcomes is available in this

data. In this paper, the relationships between Head Start and school suspensions, grade

retentions, arrests, whether the youth have drunk alcohol, and scores on the Peabody Individual

Achievement Test in mathematics (PIAT-M) are examined. The findings indicate that Head

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[2] A second study, Currie and Thomas (1996) examines the effect of Head Start on Hispanic children and differences
in the effects for various Hispanic subgroups. The same data source and methodology are used in the two papers.
[3] Given the structure of the NLSY-MCS this is equivalent to restricting the sample to those children whose mothers
have had two children by the time the mothers were 22 to 29 years of age.

Start does not result in long-term benefits for the participants. This is in accord with the finding that compensatory preschool programs that benefit participants in the long run tend to be long and intensive.

This paper is organized as follows. In section I, the empirical model is laid out and the problems with estimating it are discussed. Section II discusses the data used. I present results in section III. Section IV concludes.

I.   Empirical Issues and Model

I specify a linear approximation to the production function for the youth outcomes.

$$Q_i^k = \theta_{q1} + \theta_{q2}HS_i + \theta_{q3}CC_i + X_i^q\theta_{q4} + \rho_{ql}\mu_{qi} + \varepsilon_{qi} \tag{1}$$

where Q_i^k represents youth outcome as measured by outcome k, HS_i indicates whether youth i attended Head Start, CC_i indicates whether the youth spent twenty or more hours per week in child care in any of the first five years of his or her life, X_i^q is a vector of characteristics of the child and his or her mother that may affect the youth's outcomes, and μ_i represents permanent unobservables that may vary across households and youth and may be correlated with endogenous variables. The θ's and ρ's are parameters to be estimated and ε_i is an independent normally distributed "shock" to the child's outcome.

Both HS_i and CC_i are endogenous variables. Children who attend either Head Start or child-care are not randomly assigned to these arrangements, but placed in them by their parents.[4] Thus, the unobserved factors that affect a child's attendance of Head Start or child-care may also affect his or her later outcomes. For instance, a parent's concern for her child may affect the both the parent's decision to enroll the child in Head Start and the youth's later outcomes. Thus,

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[4] In the case of Head Start, the decisions of program administrators often affects whether a child is enrolled in Head Start since there are many more children who have applied for Head Start than there are places in Head Start.

the Head Start and child-care variables will pick-up the effects that the shared unobservables have on the outcomes.

To correct for the endogeneity of HS_i and CC_i, I jointly estimate the child's equations with the equations for HH_i and CC_i and allow the error terms to be correlated across equations. Linear approximations for HS_i and CC_i are also specified.

$$HS_i = \theta_{HS1} + X_i^{HS}\theta_{HS2} + \rho_{HSl}\mu_{HSi} + \varepsilon_{HSi} \tag{2}$$

$$CC_i = \theta_{CC1} + X_i^{CC}\theta_{CC2} + \rho_{CCl}\mu_{CC1} + \varepsilon_{CCi} \tag{3}$$

The vector X_i^q differs from X_i^{HS} in that the variables for the number of Head Start classrooms, the average cost of Head Start per child from the fiscal year of the child's fourth birthday, and whether the child experienced "hard times" at age 3, at age 4, and at age 5 are included in X_i^{HS} and excluded from X_i^q.[5] The vector X_i^q differs from X_i^{CC} in that the measures of the average weekly cost of child-care and the mean earnings for full-time, year-round working women in the year that of the child's fourth birthday are included in X_i^{CC} and excluded from X_i^q.

The Head Start and child care indicators, HS_i and CC_i, may also be endogenous to the child outcomes because these measures are available only for those youth for whom a parent interview was conducted. Information about the youth's participation in Head Start and child care are collected in a parent interview that accompanied round 1 data collection in the NLSY97. Due to non-response or not having a parent-figure eligible to complete the parent interview, 1,049 of the 9,022 youth do not have a completed parent interview. To account for the potential endogeneity that arises from having a sample composed only of those youth for whom a parent

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[5] In the survey, the youth's parents are asked whether the youth experienced hard times and at what ages. Examples of hard times provided are living without water or electricity, and living in a homeless shelter.

interview was completed, an equation indicating whether a parent interview was conducted is estimated jointly with the rest of the model.

$$PI_i = \theta_{PI1} + X_i^{PI}\theta_{PI2} + \rho_{PI1}\mu_{PIi} + \varepsilon_{PIi} \tag{4}$$

A factor structure is imposed on the error structure to account for possible correlation across the error terms. Following Heckman and Singer (1984), and Mroz (1999), this study uses a semi-parametric approach that estimates, jointly with the model, the parameters of the discrete distribution function: the probability weights and mass points of the step function. Under this methodology, the likelihood function is a weighted sum and does not involve complicated integrals. The components of the discrete distribution are determined by the data. Thus, this approach does not require strong assumptions about the exact distribution of the heterogeneity.

Using the discrete factor method, the unconditional likelihood function is formed by integrating the conditional likelihood function with respect to the discrete distributions of heterogeneity. Applications of the discrete factor method yields an unconditional likelihood function for each youth as follows:

$$L(\Theta,\Lambda) = \sum_{r=1}^{R} (\lambda_r^\rho)L_{it}(\Theta|\mu_r) \tag{5}$$

where λ_r^ρ is the probability weight on the rth point of support in the distribution of permanent heterogeneity and $\Lambda = (\lambda_r^\rho, \mu_r)$ is a vector of estimated parameters in the discrete distributions of heterogeneity. Appendix A provides a more detailed description of the likelihood function.

The unconditional likelihood function for the full sample is the product across all youth of the unconditional likelihood function given in (5). Estimation of this product will yield asymptotically unbiased estimates of (Θ,Λ), the parameters of the model. This model is estimated separately for the samples of black, non-Hispanic and of white, non-Hispanic youth.

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II.   Data and Variables

The National Longitudinal Survey of Youth 1997 (NLSY97) began in 1997 as a nationally representative sample of young men and women between the ages of 12 and 16 on December 31, 1996. The respondents were first interviewed in 1997; they will continue to be interviewed annually. This study uses the data from the first round of interviewing.

Detailed information is collected on the employment, schooling, and living arrangements of the youth. In addition, in the first round of data collection, an attempt was made to interview one parent of the each youth.[6] In the parent interview, the parent was asked questions about her or himself and about the youth. Topics covered family background, marital and employment histories of the parent, and the youth's school and residential histories, time the youth spent in child-care, and whether and at what ages the youth participated in Head Start.

Missing information about Head Start, child-care and the various child outcomes considered is treated as unknown. If any of this information is missing, the youth is not included in the estimating equation for the youth outcome. If an explanatory variable is missing, a dummy variable indicating that that variable is missing is set to one and the variable is set to zero.

The outcome measures examined are whether the youth has been suspended from school, whether the youth has been arrested, whether the youth has repeated a grade, whether the youth has drunk alcohol, and the youth's standard score on the Peabody Individual Achievement Test in mathematics (PIAT-M). Information about suspensions and grade retention is collected in the parent interview. The parent is asked whether the youth experienced these events and in what grade they occurred. Information on alcohol consumption and arrests is collected in the self-

administered portion of the youth interview. The PIAT-M is administered to youth who were not

yet enrolled in tenth grade at the time of their youth interview. PIAT scores provide general

information about academic achievement (Costenbader and Adams, 1991).

Table 1 presents descriptive statistics for the samples used to estimate the empirical

model. The table consists of three panels. Panel a of table 1 contains means for the youth of the

survey for whom a parent interview was conducted and for two subsamples of this sample. One

subsample is composed of those who did attend Head Start and the other subsample of those who

did not. Panels b and c of table 1 present the same information for white, non-Hispanic youth

and for black, non-Hispanic youth who have a parent interview, as a whole, and separately based

on Head Start participation.

There are 7843 youth for whom parent interviews were conducted and Head Start and

child care information was collected. Of these youth, about 14 % (1563) attended Head Start and

86 % (6280) did not. The youth who attended Head Start are very different from those who did

not. In general, the participants have poorer outcomes than their counterparts who did not attend

Head Start. The attendees are about twice as likely to have been suspended and to have repeated

a grade. In addition, 11 % of the Head Start participants have been arrested compared to 7 % of

those who had not participated in Head Start. The average score on the PIAT-M among those

students who did not attend Head Start is 101.6, while those who attended Head Start scored an

average of 90.2. This difference represents about 60 % of a standard deviation. In contrast,

about the same percentages (43 % and 45 %) of the attendees and non-attendees report having

consumed alcohol.

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[6]The choice of which parent to interview was based on an ordered list. Biological mothers were at the top of this
list, followed by biological fathers. Parent-figures were last on the list. See the *NLSY97 Users' Guide* for more
information.

The subsamples of youth are similar in some respects; on average the youth are the same age. In both groups, the same percentage are male and first born. However, the youth who attended Head Start currently live in households that earn significantly less income than those who did not attend Head Start. Average household income among those who attend Head Start is $28,386.60 versus $56,251.70 in the households of the youth who do not attend Head Start. In both of the subsamples, current household income is missing for approximately 17 % of the members.

The mothers of the Head Start participants differ from the mothers of the youth who did not participate in Head Start. The mothers of Head Start attendees are from larger families and are less well educated than the mothers of the non-attendees. In both of the subsamples, the highest grade completed by mother of the median youth is a high school diploma. However, in the subsample of youth who attended Head Start, 37 % of the mothers had not earned a high school diploma and 14 % had earned a degree higher than a high school diploma. While in the subsample of youth who did not attend Head Start, 17 % of the mothers had not earned a high school diploma and 33 % earned a degree beyond a high school diploma. Similarly, the maternal grandmothers of those who did not attend Head Start are better educated than the maternal grandmothers of those who did attend Head Start.

Panel b of table 1 presents the sample statistics for those youth who are white and non-Hispanic. Compared to the youth as a whole, the white youth live in higher income households, have better educated mothers and grandmothers, have marginally better outcomes overall, and significantly higher PIAT-M scores. This is also true of white Head Start attendees and non-attendees when compared to the corresponding sample of youth of all races.

The white youth are less likely to have been Head Start participants; only 8 % attended Head Start (324 out of 4066). As in the sample of all youth, whites who attend Head Start have poorer outcomes relative to their counterparts who did not attend Head Start. The suspension rate among Head Start attendees is 35 % versus 18 % among non-attendees; 11 % versus 7 % had ever been arrested, and 23 % versus 11 % had repeated a grade. The youth who attended Head Start scored an average of 95.02 on the PIAT-M, while those who did not scored 104.24 on average. This nine-point increase represents about half of a standard deviation in test scores. In the two subsamples, roughly the same percentages of those who did and did not attend Head Start have consumed alcohol, 51 % and 48 %.

White youth who did and did not attend Head Start are roughly the same ages, but a slightly larger percentage of the Head Start subsample is male. Average household income among those who did not attend Head Start ($61,411.17) is nearly twice as large as average household income among those who did attend Head Start ($31,966.70).

Among white, non-Hispanics, mothers of the Head Start participants have about one more sibling than those youth who did not attend Head Start. They are also less well educated. While in both subsamples, the mother of the median youth has a high school diploma, a smaller percentage of Head Start attendees had mothers who had a degree higher than a high school diploma and a larger proportion had not obtained a high school diploma as compared to the mothers of non-attendees. The pattern with respect to highest grade completed by the youth's maternal grandmother is similar.

About 12 % of the Head Start attendee's biological mothers live outside of the youth's household. In the subsample of youth who did not attend Head Start, 7 % have mothers who lives outside of the sample.

In table 1c, this same information is presented for black, non-Hispanics. Compared with the sample of whites or the sample of all youth, a much higher percentage of the black youth, 41 %, attended Head Start. The incidence of the bad outcomes is higher in the black sample compared to the sample of all youth. Additionally, the difference between the incidences of an adverse event for Head Start participants and those for non- participants is smaller when the sample is restricted to black, non-Hispanics. Among black, non-Hispanic youth who attended Head Start, 53 % had been suspended, 10 % had been arrested, 35 % had drunk alcohol, and 35 % had repeated a grade. Among those who did not attend Head Start, 43 % had been suspended, 9 % had been arrested, 35 % had drunk alcohol, and 22 % had repeated a grade. The difference in PIAT-M scores across the two subsamples is also smaller; the average scores among Head Start participants and non-participants are 86.27 and 90.07.

The youth in the two subsamples are approximately the same age. In the Head Start subsample a slightly higher percentage are male and a slightly lower percentage are first-born. Income-levels are more similar across the two subsamples than they were for the other samples considered; the average household income in the Head Start sample is $26,015.64 and in the non-Head Start sample is $35412.35. The percentage for which income is missing is 21.4 % and 25.1 % in the two subsamples respectively.

Roughly half of the youth in both subsamples has a mother whose highest degree earned is a high school diploma. However, the mothers of the youth who did not attend Head Start are better educated than the mothers of the youth who did. Among the former, 23.1 % earned less than a high school diploma and 24.2 % earned a degree beyond a high school diploma. The corresponding numbers for the latter group are 31.9 % and 12.5 %. In addition, maternal

grandmothers of the black Head Start attendees are less well educated than those of their counterparts who did not attend Head Start.

Comparisons of the descriptive statistics indicate that Head Start attendees fare worse than non-attendees with respect to the outcomes examined here. These statistics also show that the youth who attended Head Start come from more disadvantaged backgrounds. It may be that the differences in background are producing the poor outcomes of the Head Start participants.

III.   Results

In this section, I present results. The focus is on the child outcome equations. The results are also discussed for the equations that explain whether or not a parent interview was conducted, whether the youth attended Head Start, and whether the youth attended child care for twenty or more hours a week in at least one of the years before his or her fifth birthday.

The specification used is based on that of Currie and Thomas (1995). Due to data limitations there are two, arguably important, differences between their specification and the one presented here. First, in this paper's specification the logarithm of 1997 household income is included as a regressor. Currie and Thomas were able to construct a measure of permanent household income using annual household income between 1978 and 1990. The logarithm of permanent income is included in their model. Second, Currie and Thomas included the mother's score on the Armed Forces Qualification Test (AFQT) as a control variable. That measure is not available in the NLSY97. Additionally, the methodology used here is different than that of Currie and Thomas.

IIIA.   Estimates of the Youth Outcome Equations

Table 2 presents the regression results for the various youth outcomes. Table 2 is composed of five panels (a-e); each panel presents the results for a different outcome. Four sets

of results are contained in each panel of table 2. The first two columns of each panel present the coefficient estimates and standard errors for white youth from the model that contains no controls for unobserved heterogeneity. The third and fourth columns also present results for the white youth from the model that includes controls for unobserved heterogeneity. Columns five through eight present the analogous results for the black youth. In the model that controls for unobserved heterogeneity, five and three factors are included respectively for the white and the black youth; each factor has two mass points.[7]

For the white youth, participation in Head Start does not affect the child outcomes that are considered, while attendance of child care is associated with increases in the likelihood of some of the adverse outcomes. Attendance of child care increased the probability of arrest and of having consumed alcohol.

The characteristics of the white youth affect their outcomes. Older youth are more likely to have been suspended, to have been arrested, to have drunk alcohol, and to have repeated a grade. Being a month older decreases the white youth's PIAT-math score by about 0.2 points.

Among the white youth, males have poorer outcomes than females. All else equal, being male increases the likelihood that one has been suspended, has been arrested, and has repeated a grade. First-born youth are less likely to have been arrested and to have drunk alcohol. Current household income appears to improve the outcomes of the white youth. Living in a household of higher income decreases the likelihood that the youth has been suspended from school, has been arrested, has repeated a grade, and increases the youth's score on the PIAT-math.

Having a better-educated mother is also associated with better outcomes. For white youth, having a mother who has a high school diploma or a higher degree decreases the

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[7] Factors have been added to the models until the hypothesis that the last factor added improves the fit of the model can be rejected. However, the appropriate number of mass points for the factors has not yet been considered.

likelihood of having been suspended from school, of having been arrested, and of having repeated a grade. Having a mother who has earned at least a high school diploma also increases the youth's score on the PIAT-math. Having a mother who has completed a bachelor's degree or a higher degree decreases the likelihood that the youth has drunk alcohol. For the most part, the higher the degree completed by the mother, the larger the benefit to the youth. The highest grade completed by the youth's maternal grandmother does not affect the youth's outcomes.

In general, the outcomes of the white youth are not affected by whether the youth's biological mother is the interviewed parent, the spouse of the interviewed parent, a non-resident parent, or no biological mother is found in the youth's household or non-resident rosters. The only exception to this is that having no biological mother has a positive effect on the probability that the youth has been arrested and on PIAT-math scores.

Among the black youth, participation in Head Start is associated with poorer school outcomes, yet Head Start has no affect on the non-school outcomes considered. That is, the youth who participated in Head Start are more likely to have been suspended, and to have repeated a grade. The Head Start participants score lower on the PIAT-math. However, there is no significant relationship estimated between Head Start and having been arrested or having drunk alcohol.

In contrast, child care is associated with better outcomes for the black youth. Having spent at least twenty hours a week in child care in some year before age 5 decreases the likelihood that an individual has been suspended, or has repeated a grade, and substantially increases the youth's score on the PIAT-math. As was the case for Head Start participation, having attended child care is unrelated to the probability that the black youth have been arrested or have consumed alcohol.

In a few cases, the characteristics of the black youth affect their outcomes. Black males are more likely than black females to have been suspended and to have repeated a grade. The older the youth, the more likely he or she is to have drunk alcohol, and the lower his or her score on the PIAT-math. Being first-born increases the likelihood of having repeated a grade.

The black youth's outcomes improve with his or her mother's educational attainment. Both the probability of having been suspended and the probability of having repeated a grade decrease as the biological mother's highest degree completed rises. Having a mother who completed an associate's degree or higher significantly increases the score on the PIAT-math for a black youth. Having a mother whose highest degree completed is either an associate's degree or a bachelor's degree increases the probability that the youth has ever drunk alcohol. In contrast, the youth's grandmother's educational attainment is significant only in one case. Youth whose maternal grandmothers have completed 13 to 15 grades are more likely to repeat a grade.

The number of siblings that the youth's mother had at age 14 affects some the outcomes. The more siblings a mother had the more likely the youth is to have repeated a grade. For each additional sibling of the youth's mother, the youth's PIAT-math score decreases by about half a point.

With regard to the outcomes considered here, Head Start benefits neither the white nor the black youth. Child care has positive effect on blacks and no effect on the whites. It may be that the resources provided to children in Head Start programs are not large enough or that the duration over which the resources are received is not long enough to bring about lasting results.

IIIB. Evaluation of the Model

The effect of controlling for the endogeneity of Head Start participation and of child care attendance can be assessed by comparing the coefficient estimates from the specification which

restricts the factor loads to zero versus the specification in which the factor loads are estimated jointly with the rest of the model.[8,9] Results from the model with and without controls for the endogeneity of Head Start and child care are presented in each panel of table 2.

For the white sample, at least one of the factors has significant effects in each of the equations. This suggests that simultaneity issues are important. For each outcome considered the coefficient on Head Start changes sign when the heterogeneity controls are included. When the controls are included, participation in Head Start moves from having a significant and positive effect on the probability of having been suspended from school or having repeated a grade to having no effect on these outcomes. Similarly, when the factor loads were restricted to zero having attended Head Start decreases one's PIAT-math score, while when the factor loads are estimated as part of the model Head Start attendance has no effect on PIAT-math score. In addition, in the equation that estimates whether the youth has ever been arrested. When the heterogeneity controls are included, the coefficient child care increases in magnitude and becomes significant.

There are differences in many of the coefficients in the equation explaining the youth's scores on the PIAT-math depending on whether the factor loads are restricted to be zero. With the inclusion of the heterogeneity controls, the magnitude of a number of variables falls dramatically although their significance is not affected. These variables include the dummy variable indicating the youth is male, household income, and the set of variables representing the biological mother's highest degree completed.

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[8] Estimating the equations with no heterogeneity controls is equivalent to estimating each equation separately.
[9] For both the blacks and whites, a likelihood ration test based on the unrestricted and restricted specifications strongly rejects the hypothesis of no unobserved heterogeneity. For the black sample the test statistics is 336.66 with 27 degrees of freedom. For the white sample, the test statistic is 1139.72 with 45 degrees of freedom.

Simultaneity issues also appear to be important in estimating the model for the black sample. For each equation, at least one of the factor loads has significant effects. In the Head Start, school suspension, grade retention and PIAT-math equations, all three of the factor loads have significant effects. Controlling for unobserved heterogeneity does change the results with respect to child care. In the regressions without heterogeneity controls, child care was unrelated to all youth outcomes. When the controls are included, child care significantly decreases the likelihood that the youth has been suspended from school or repeated a grade, and significantly improves the youth's score on the PIAT-math. However, adding controls for unobserved heterogeneity does not impact the relationship between Head Start and the various outcome measures for the youth.

The addition of the heterogeneity controls affects the coefficients on the household income variables. When no heterogeneity controls were included, in the estimates for the black sample, higher household income implies a lower likelihood of having been suspended and of having repeated a grade and a higher PIAT-math score. However, after controlling for unobserved heterogeneity, current household income has no effect on these outcomes. For the other outcomes examined (ever having drunk alcohol, ever having been arrested), household income is insignificant whether the heterogeneity controls are included or not.

In the equation explaining whether the youth has been suspended, mother's height is significant when the factor loads are restricted to zero, but becomes insignificant when the factor loads are estimated jointly with the rest of the model. Similarly, in the equation explaining whether the youth repeated a grade, the variable indicating the number of siblings of the child's mother is significant when the factor loads are restricted to zero, but becomes significant when they are estimated with the rest of the model.

IIIC.   Regression Results for Other Equations

This section discusses the results from the other equations that comprise the model: whether the youth participated in Head Start, whether the youth attended child care regularly in at least one year before age five, and whether a parent interview was conducted for the youth. The results presented are those from the model with the controls for unobserved heterogeneity.

Table 3 contains the results from the Head Start equation for the white sample and the black sample. In this equation, the variables that are significant and the signs on the coefficients for these variables are the same for the blacks and whites. Living in a household of higher income or in a household for which income was not reported decreases the likelihood that the youth was a Head Start attendee. Having a better-educated mother also decreases the probability that the youth attended Head Start. The coefficients on mother's highest degree completed are significant and negative on high school diploma and all higher degrees. The magnitude of these coefficients rises with mother's highest degree completed. In addition, for youth in both samples the likelihood that the youth attended Head Start is increasing in the number of siblings that the youth's mother had at age 14.

In table 4 the results from the equation that explains whether the youth regularly attended child care for black youth and white youth are presented. The patterns of significance are different for the whites and blacks. When the equation is estimated for the white sample, the average earnings of white women (in the year that the youth was four years-old) increases the probability that the youth attended child care. However, when the child care equation was estimated using the black youth, the average earnings of black women do not affect the probability that the youth attended child care.

In both samples, being the first-born child increases the likelihood of child care attendance. Household income also increases the chance that the youth, black and white, regularly attended child care. For blacks, a missing value for household income increases the likelihood that the youth attended child care.

In both samples, the likelihood of having attended child care is increasing in the youth's mother's highest degree completed. The coefficients on the variables that indicate the youth's mother earned a high school diploma or a higher degree are positive and significant.

The black youth's relationship to his or her biological mother has significant effects on the probability that youth attended child care. Having no biological mother listed on the youth's household or non-resident roster makes it more likely that the youth was a child care attendee (than those in the omitted category whose biological mother is his or her responding parent). In contrast, those youth whose biological mother lives outside the youth's household (non-resident parent) are less likely to have attended Head Start.

Table 5 displays the results from the equation estimating whether a responding parent interview was conducted for the youth. For both the white and black youth, the month in which the youth was interviewed affected whether a parent interview was conducted for the youth. The later in the interview period that the youth was interviewed, the less likely that a parent-interview was collected.

For the white youth, living in a household with one or more parent figures (as opposed to no parental figures) increases the likelihood that a parent interview was collected. Additionally, among the white youth having a mother whose highest degree completed is a high school diploma or higher increases the likelihood that a parent interview was collected.

For the black youth, living in a household from which two or more youth are sample members increases the likelihood that a parent interview is collected. For black youth, having a mother whose highest degree earned is an associate's degree increases the chance that a parent interview was collected for the youth.

IV.   Conclusion

Taken as a whole, the previous work that has examined the effects of Head Start on child outcomes (other than IQ) has been inconclusive on whether the benefits persist. To a large extent, this has been driven by the available data. Using the NLS97 to study this issue remedies some of the data issues because it is both a large, nationally representative data set and contains outcomes up to the teen-age years.

The estimates presented here indicate that participation in Head Start does not have long-term benefits. This finding is compatible with the findings that compensatory preschool programs are more likely to improve participants' outcomes in the long-term if the programs are long in duration and intensive.

The finding that Head Start is found to have negative effect on school-related outcome for the black youth is troubling. This may indicate that the unobservables that affect both these outcomes and the probability that a youth participated in Head Start have not yet been controlled for sufficiently.

The estimates presented here are not final. First, although the number of factors included in the model has been selected on a statistical basis, the number of support points for each of the factors has not yet been considered. Second, the developmental psychology literature indicates that the effects of these programs are a function of their duration. The number of years that a

respondent spent in Head Start and in child care are available in this data and should be examined in the future.

Finally, this paper has examined the outcome of the youth, other indicators may also predict the relationship between Head Start participation and success as an adult. For example, number of hours spent doing homework/studying and expectations about attending college be early measures of educational attainment. Both are available in the NLS97.

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Appendix A: Likelihood Function

A set of dummy variables indicates which observations are used to estimate each of the equations.[10] Conditional on unobserved heterogeneity, the individual-specific likelihood function given by

$$L_i(\Theta|\mu_i) = \left[Pr(PI_i = 0|\mu_i)\right]^{1-d(p_i)}$$

$$\begin{bmatrix} (Pr(PI_i = 0|\mu_i) \\ (Pr(HS_i = 0|\mu_i))^{1-d(hs_i)}(Pr(HS_i = 1|\mu_i))^{d(hs_i)}(Pr(CC_i = 0|\mu_i))^{1-d(cc_i)}(Pr(CC_i = 1|\mu_i))^{d(cc_i)} \\ \prod_{k=1}^{5} Pr(co_i^k = 0|\mu_i)^{1-d(co_i^k)} Pr(co_i^k = 1|\mu_i)^{d(co_i^k)} \\ f_{ts} = (s_i = s^*|\mu_i) \end{bmatrix}^{d(pi_i)}$$

where Θ is the vector of parameters to be estimated and f_{ts} is the distribution of ε_{ts} (the independent error in the equation for the youth's PIAT-math score).

The first line estimates the probability that a parent interview was not conducted for the youth. Lines two through five are estimated for the youth for whom a parent interview was conducted. The line two estimates the probability that a parent interview was conducted. Line three contains the probabilities that a child did and did not attend Head Start and child care. One Head Start probability and one child care probability are estimated for each youth based on whether she attended Head Start and child care. The fourth line estimates the probabilities that the youth did or did not experience child outcome k. For each child outcomes, one probability is estimated for each youth depending on whether he experienced outcome k. The final line estimates the math achievement test scores for youth for whom the scores are available.

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[10] The dummy variables are defined in the following way: $d(pi_i)=1$ if a parent interview was conducted for the youth and 0 otherwise, $d(hs_i)=1$ is the youth was ever enrolled in Head Start and 0 otherwise, $d(cc_i)=1$ if the child spent more than twenty hours a week in child care during the first five years of his or her live and 0 otherwise, $d(co_i^k)=1$ if child outcome k was experienced by the youth and 0 otherwise.

Table 1a: Sample of All Youth with Parent Interviews

Variables	Full Sample		Attended Head Start		Did Not Attend Head Start	
	Mean	Std. Dev.	Mean	Std. Dev	Mean	Std. Dev
Ever Suspended	0.2495	0.4328	0.4334	0.4957	0.2189	0.4135
Ever Arrested	0.0741	0.2620	0.1076	0.3100	0.0685	0.2527
Ever Drink Alcohol	0.4512	0.4976	0.4319	0.4955	0.4544	0.4980
Repeat Grade	0.1494	0.3566	0.2779	0.4481	0.1279	0.3340
PIAT -M	99.8758	18.9230	90.1954	18.8067	101.6107	18.4152
Head Start	0.1426	0.3497	1	--	0	--
Child Care	0.4862	0.4998	0.5157	0.4999	0.4813	0.4997
Characteristics of Youth						
Age (in months)	178.0081	17.5656	177.4026	17.7107	178.1088	17.5405
Male	0.5135	0.4999	0.5173	0.4999	0.5128	0.4999
First Born	0.5042	0.5000	0.4958	0.5002	0.5055	0.5000
HH Income	52254.25	43087.43	28386.60	23609.12	56251.70	44303.94
Missing HH Income	0.1760	0.3808	0.1717	0.3772	0.1767	0.3814
Characteristics of Biological Mother						
# of Siblings	3.9724	2.7961	5.2930	2.6420	3.7547	3.2978
Missing # of Siblings	0.0570	0.2319	0.0643	0.2454	0.0558	0.2249
Height	64.1862	2.7538	64.0491	2.8487	64.2219	2.7277
Missing Height	0.1338	0.3404	0.1007	0.3010	0.1393	0.3463
Highest Degree Completed--Biological Mother						
No Degree	0.1441	0.3512	0.2800	0.4492	0.1214	0.3267
GED	0.0606	0.2386	0.0934	0.2911	0.0550	0.2282
High School	0.4898	0.4999	0.4868	0.5000	0.4903	0.4999
Associates Degree	0.1026	0.3034	0.0861	0.2806	0.1053	0.3070
Bachelors Degree	0.1470	0.3542	0.0450	0.2075	0.1640	0.3703
More than Bachelors Degree	0.0556	0.2292	0.0087	0.0927	0.0634	0.2438
Missing Highest Degree	0.0532	0.2245	0.0519	0.2218	0.0534	0.2249
Relationship of Biological Mother						
No Biological Mother	0.0200	0.1399	0.0116	0.1072	0.0214	0.1446
Responding Parent	0.8175	0.3863	0.8388	0.3679	0.8140	0.3892
Spouse of responding parent	0.0788	0.2695	0.0349	0.1837	0.0861	0.2806
Non-resident parent	0.0837	0.0870	0.1146	0.3258	0.0785	0.2665
Highest grade completed--Maternal grandmother						
No grades completed	0.0262	0.1597	0.0415	0.1994	0.0237	0.1523
1-8	0.2080	0.4059	0.3053	0.4607	0.1926	0.3944
9-11	0.1608	0.3673	0.2271	0.4191	0.1502	0.3573
12	0.4060	0.4911	0.3250	0.4686	0.4188	0.4934
13-15	0.0966	0.2955	0.0508	0.2197	0.1039	0.3051
16 or more	0.1025	0.3033	0.0503	0.2187	0.1107	0.3138
Missing	0.1294	0.3357	0.1634	0.3699	0.1237	0.3293
Number of Observations	7843		1563		6280	

Variables	Full Sample		Attended Head Start		Did Not Attend Head Start	
	Mean	Std. Dev.	Mean	Std. Dev	Mean	Std. Dev
Ever Suspended	0.1973	0.3980	0.3517	0.4782	0.1843	0.3878
Ever Arrested	0.0683	0.2523	0.1064	0.3089	0.0651	0.2467
Ever Drink Alcohol	0.4798	0.4997	0.5094	0.5007	0.4773	0.4996
Repeat Grade	0.1196	0.3245	0.2304	0.4218	0.1102	0.3132
PIAT -M	103.4710	17.6773	95.0204	19.1351	104.2396	17.3395
Head Start	0.0777	0.2677	1	--	0	--
Child Care	0.4884	0.4999	0.4941	0.5007	0.4879	0.4999
Characteristics of Youth						
Age (in months)	177.9662	17.5917	176.8064	17.8145	178.0639	17.5717
Male	0.5130	0.4999	0.5504	0.4982	0.5098	0.5000
First Born	0.5148	0.4999	0.5333	0.4997	0.5133	0.4999
HH Income	59089.08	44869.27	31966.70	23263.18	61411.17	45509.30
Missing HH Income	0.1538	0.3608	0.1507	0.3583	0.1541	0.3611
Characteristics of Biological Mother						
# of Siblings	3.3607	2.2928	4.2216	2.7446	3.2894	2.2370
Missing # of Siblings	0.0485	0.2149	0.0639	0.2450	0.0479	0.2122
Height	64.5517	2.6186	64.4602	2.8401	64.5597	2.5987
Missing Height	0.1298	0.3361	0.1029	0.2450	0.1321	0.3386
Highest Degree Completed--Biological Mother						
No Degree	0.0864	0.2810	0.2254	0.4185	0.0747	0.2630
GED	0.0618	0.2408	0.1230	0.3290	0.0566	0.2312
High School	0.5026	0.5001	0.4671	0.4997	0.5055	0.5000
Associates Degree	0.1126	0.3161	0.1042	0.3060	0.1133	0.3170
Bachelors Degree	0.1694	0.3752	0.0641	0.2453	0.1782	0.3828
More than Bachelors Degree	0.0670	0.2501	0.0163	0.1267	0.0713	0.2574
Missing Highest Degree	0.0397	0.1952	0.0440	0.2053	0.0393	0.1919
Relationship of Biological Mother						
No Biological Mother	0.0178	0.1320	0.0074	0.0858	0.0186	0.1352
Responding Parent	0.8207	0.3836	0.8312	0.3752	0.8199	0.3844
Spouse of responding parent	0.0862	0.2807	0.0363	0.1874	0.0904	0.2868
Non-resident parent	0.0753	0.2620	0.1241	0.3453	0.0712	0.2544
Highest grade completed--Maternal grandmother						
No grades completed	0.0024	0.0485	0.0070	0.0832	0.0020	0.0445
1-8	0.1445	0.3516	0.1842	0.3884	0.1412	0.3483
9-11	0.1545	0.3614	0.2323	0.4231	0.1481	0.3553
12	0.4661	0.4989	0.4164	0.4938	0.4702	0.4992
13-15	0.1123	0.3158	0.0614	0.2406	0.1164	0.3208
16 or more	0.1203	0.3254	0.0987	0.2988	0.1220	0.3274
Missing	0.1062	0.3081	0.1348	0.3420	0.1038	0.3050
Number of Observations	4066		324		3742	

Variables	Full Sample		Attended Head Start		Did Not Attend Head Start	
	Mean	Std. Dev.	Mean	Std. Dev	Mean	Std. Dev
Ever Suspended	0.4719	0.4993	0.5318	0.4993	0.4301	0.4953
Ever Arrested	0.0921	0.2893	0.1020	0.3028	0.0852	0.2794
Ever Drink Alcohol	0.3507	0.4773	0.3506	0.4774	0.3507	0.4774
Repeat Grade	0.2748	0.4465	0.3467	0.4762	0.2239	0.4170
PIAT -M	88.4502	18.5580	86.2652	18.2109	90.0667	18.6577
Head Start	0.4111	0.4922	1	--	0	--
Child Care	0.5384	0.4986	0.5442	0.4983	0.5344	0.4990
Characteristics of Youth						
Age (in months)	177.9862	17.5500	178.0515	17.5639	177.9406	17.5473
Male	0.5051	0.5001	0.5333	0.4997	0.5133	0.4999
First Born	0.5187	0.4998	0.4882	0.5002	0.5406	0.4986
HH Income	31452.91	27788.63	26015.64	24165.03	35412.35	29544.35
Missing HH Income	0.2356	0.4245	0.2136	0.4101	0.2510	0.4338
Characteristics of Biological Mother						
# of Siblings	5.4888	3.3942	5.8559	3.6047	5.2266	3.2116
Missing # of Siblings	0.0868	0.2815	0.0743	0.2624	0.0955	0.2940
Height	64.5329	2.8096	64.6130	2.8087	64.4331	2.8092
Missing Height	0.1224	0.3278	0.1067	0.3089	0.0954	0.2940
Highest Degree Completed--Biological Mother						
No Degree	0.2079	0.4059	0.2622	0.4401	0.1686	0.3746
GED	0.0603	0.2382	0.0570	0.2319	0.0628	0.2427
High School	0.5375	0.4987	0.5503	0.4973	0.5246	0.4996
Associates Degree	0.0908	0.2874	0.0890	0.2849	0.0921	0.2893
Bachelors Degree	0.0814	0.2735	0.0306	0.0771	0.1181	0.3229
More than Bachelors Degree	0.0211	0.1439	0.0060	0.0771	0.0321	0.1764
Missing Highest Degree	0.0820	0.2744	0.0627	0.2425	0.0954	0.2940
Relationship of Biological Mother						
No Biological Mother	0.0296	0.1695	0.0202	0.1409	0.0361	0.1866
Responding Parent	0.8059	0.3956	0.8267	0.3787	0.7913	0.4065
Spouse of responding parent	0.0348	0.1833	0.0323	0.1770	0.0365	0.1876
Non-resident parent	0.1296	0.3406	0.1207	0.3347	0.1361	0.3447
Highest grade completed--Maternal grandmother						
No grades completed	0.0160	0.1255	0.0144	0.1191	0.0172	0.1301
1-8	0.2814	0.4498	0.3120	0.4697	0.2590	0.4384
9-11	0.2522	0.4344	0.2821	0.4504	0.2304	0.4214
12	0.3320	0.4711	0.3175	0.4658	0.3426	0.4749
13-15	0.0711	0.2471	0.0549	0.2279	0.0830	0.2760
16 or more	0.0473	0.2123	0.0191	0.1371	0.0677	0.2514
Missing	0.1224	0.3278	0.1910	0.3933	0.2235	0.4168
Number of Observations	2015		888		1127	

Table 2a: Ever Suspended

Variables	White Youth				Black Youth			
	No Heterogeneity Controls		Heterogeneity Controls		No Heterogeneity Controls		Heterogeneity Controls	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	-1.0549	2.1902	-2.651	3.8137	-1.3698	0.9561	-2.0927	1.0185
Head Start	0.3182	0.0922	-0.7372	0.4113	0.1762	0.0663	0.1880	0.0800
Child Care	0.1107	0.0540	0.4039	0.3041	0.0199	0.0693	-0.4617	0.1665
Characteristics of Youth								
Age (in months)	0.0148	0.0016	0.0360	0.0063	0.0034	0.0018	0.0025	0.0019
Male	0.6174	0.0545	1.5583	0.2569	0.5353	0.0645	0.5481	0.0685
First Born	-0.0086	0.0560	-0.0296	0.1333	-0.1457	0.0716	-0.1000	0.0758
HH Income	-0.2060	0.0390	-0.6095	0.1319	-0.1029	0.0370	-0.0530	0.0407
Missing HH Income	-2.2971	0.4219	-6.8255	1.4503	-1.2478	0.3725	-0.6493	0.4090
Characteristics of Biological Mother								
# of Siblings	-0.0031	0.0124	0.0243	0.0289	0.0140	0.0103	0.0188	0.0110
Missing # of Siblings	-0.2289	0.2326	-0.5428	0.5736	-0.1807	0.2590	-0.1689	0.2815
Height	-0.0002	0.0108	-0.0068	0.0229	0.2357	0.0123	0.0145	0.0129
Missing Height	-0.0141	0.7337	0.0305	1.5669	0.7143	0.8320	0.5673	0.8817
Highest Degree Completed-- Biological Mother								
GED	-0.0736	0.1268	-0.3327	0.2929	-0.1317	0.1604	-0.0428	0.1665
High School	-0.4268	0.0921	-1.1080	0.2620	-0.3430	0.0902	-0.2821	0.0955
Associates Degree	-0.5709	0.1217	-1.4574	0.3492	-0.2700	0.1396	-0.2127	0.1508
Bachelors Degree	-0.7476	0.1198	-1.9451	0.3960	-0.4303	0.1512	-0.3700	0.1649
More than Bachelors Degree	-0.6474	0.1435	-1.6130	0.4117	-0.9513	0.3053	-0.9342	0.3106
Missing Highest Degree	-0.5880	0.1802	-1.4455	0.4874	-0.4421	0.1723	-0.5129	0.1800
Relationship of Biological Mother								
No Biological Mother	0.2461	0.2849	0.0306	0.6828	0.2357	0.3008	0.2774	0.3158
Spouse of responding parent	-0.1094	0.2589	-0.8371	0.6573	-0.0760	0.3113	-0.1717	0.3434
Non-resident parent	0.1528	0.1249	0.2285	0.2770	0.3355	0.1343	0.2833	0.1409
Highest grade completed-- Maternal grandmother								
1-8	-0.2574	2.0187	-1.1369	3.7378	0.5014	0.3124	0.5889	0.3380
9-11	-0.2253	2.0191	-0.9352	3.7383	0.5887	0.3127	0.6614	0.3391
12	-0.3084	2.0188	-1.1920	3.7421	0.6123	0.3122	0.6692	0.3393
13-15	-0.2361	2.0196	-0.9921	3.7398	0.5239	0.3435	0.6700	0.3768
16 or more	-0.3132	2.0205	-1.2065	3.7533	0.3091	0.3617	0.3965	0.3967
Missing	-0.0448	2.0204	-0.6184	3.7321	0.7147	0.3162	0.8095	0.3442
Number of Observations	4065				2019			

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Table 2b: Ever Arrested

Variables	White Youth				Black Youth			
	No Heterogeneity Controls		Heterogeneity Controls		No Heterogeneity Controls		Heterogeneity Controls	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	-3.4589	1.1888	-13.8303	4.4326	-2.1438	1.4269	-26.3811	48.3106
Head Start	0.1491	0.1176	-0.3454	0.4653	0.0698	0.0986	-10.1043	13.9172
Child Care	0.0528	0.0728	1.9039	0.4195	0.0068	0.1095	-15.0923	20.7591
Characteristics of Youth								
Age (in months)	0.0190	0.0024	0.0650	0.0121	0.0077	0.0030	0.1527	0.2152
Male	0.4211	0.0737	1.3330	0.2894	0.5118	0.0956	18.1913	24.1551
First Born	-0.1900	0.0776	-0.9186	0.2643	-0.0189	0.1023	10.5276	13.9009
HH Income	-0.2003	0.0527	-0.6583	0.1600	-0.0067	0.0634	0.9665	2.5358
Missing HH Income	-2.2872	0.5678	-7.7564	1.8048	-0.4481	0.6359	-13.8701	32.0651
Characteristics of Biological Mother								
# of Siblings	-0.0159	0.0170	-0.0358	0.0490	0.0300	0.0152	2.3973	3.2325
Missing # of Siblings	-0.5859	0.5791	-2.0670	2.3524	-0.2977	0.4336	14.3788	23.2893
Height	0.0121	0.0143	0.0035	0.0365	-0.0080	0.0183	-0.8388	1.1579
Missing Height	0.7342	1.0701	0.7408	3.2242	-0.3361	1.2775	-30.7755	48.7418
Highest Degree Completed-- Biological Mother								
GED	-0.0043	0.1632	-0.7876	0.5463	-0.1161	0.2135	5.0241	7.9086
High School	-0.3271	0.1210	-1.3466	0.4143	-0.3675	0.1229	-20.4916	27.0445
Associates Degree	-0.2101	0.1561	-1.4710	0.5338	-0.3207	0.2056	-22.7745	30.3793
Bachelors Degree	-0.5294	0.1631	-2.4410	0.6400	-0.4169	0.2787	-34.4598	45.2143
More than Bachelors Degree	-0.3239	0.1943	-1.3837	0.5953	-0.0850	0.3581	-13.3250	33.7156
Missing Highest Degree	0.0016	0.2523	-0.3908	0.7827	-0.0961	0.2070	-27.9599	37.5175
Relationship of Biological Mother								
No Biological Mother	0.7601	0.3645	2.6411	1.1906	0.2427	0.39734	-14.6076	20.8525
Spouse of responding parent	0.0710	0.5601	-0.5509	2.3083	-0.7668	0.5737	-56.0375	77.9775
Non-resident parent	0.3020	0.1540	0.7659	0.4802	0.1060	0.1628	-12.4557	17.6876
Highest grade completed-- Maternal grandmother								
1-8	-0.1342	0.1639	-0.4249	0.4616	-0.4971	0.1665	-24.5472	32.5911
9-11	0.0112	0.1586	0.1808	0.4106	-0.0526	0.1549	-12.3481	16.7260
12	-0.0552	0.1446	0.0036	0.3636	-0.1812	0.1611	-22.9672	29.9610
13-15	0.0040	0.1793	0.3169	0.4512	-0.0952	0.2404	-25.0340	33.2077
16 or more	0.1768	0.1746	0.4859	0.4600	-0.5903	0.4219	-43.4453	75.0607
Missing	--	--	--	---	--	--	---	---
Number of Observations	4066				2019			

Table 2c: Ever Drink Alcohol

Variables	White Youth				Black Youth			
	No Heterogeneity Controls		Heterogeneity Controls		No Heterogeneity Controls		Heterogeneity Controls	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	-6.4632	1.6229	-7.6042	1.5454	-3.5809	0.9990	-3.5075	1.0405
Head Start	0.0578	0.0901	-0.2094	0.1332	0.0142	0.0665	-0.0907	0.0763
Child Care	0.1971	0.0444	0.3644	0.0824	0.0507	0.0694	0.0225	0.1597
Characteristics of Youth								
Age (in months)	0.0300	0.0013	0.0354	0.0018	0.0203	0.0019	0.0204	0.0019
Male	0.0606	0.0441	0.0704	0.0499	-0.0508	0.0065	-0.0776	0.0671
First Born	-0.1256	0.0461	-0.1755	0.0532	-0.0047	0.0716	0.0045	0.0740
HH Income	-0.0423	0.0331	-0.0622	0.0374	-0.0338	0.0407	-0.0355	0.0433
Missing HH Income	-0.5581	0.3625	-0.7988	0.4091	-0.3682	0.4132	-0.3897	0.4383
Characteristics of Biological Mother								
# of Siblings	-0.0065	0.0099	-0.0030	0.0115	0.0030	0.0105	0.0039	0.0109
Missing # of Siblings	0.0011	0.2143	-0.0100	0.2363	0.0217	0.2631	0.0601	0.2655
Height	0.0127	0.0090	0.0103	0.0101	-0.0128	0.0123	-0.0126	0.0127
Missing Height	0.7025	0.6278	0.6124	0.7042	-0.7840	0.8399	-0.7148	0.8666
<u>Highest Degree Completed-- Biological Mother</u>								
GED	-0.0116	0.1201	-0.1159	0.1387	-0.1782	0.1590	-0.1179	0.1635
High School	-0.0639	0.0843	-0.1379	0.0989	-0.0388	0.0914	-0.0263	0.0961
Associates Degree	0.0391	0.1051	-0.0484	0.1209	0.3555	0.1443	0.38877	0.1521
Bachelors Degree	-0.1474	0.1008	-0.2732	0.1183	0.3105	0.1506	0.3022	0.1575
More than Bachelors Degree	-0.2524	0.1220	-0.3543	0.1421	-0.1246	0.2750	-0.1257	0.2800
Missing Highest Degree	-0.2431	0.1600	-0.3381	0.1816	0.2396	0.1663	0.1803	0.1711
Relationship of Biological Mother								
No Biological Mother	0.0267	0.2615	-0.0043	0.2922	0.3781	0.2784	0.3730	0.2763
Spouse of responding parent	-0.1538	0.2391	-0.2583	0.2666	-0.2705	0.3110	-0.3298	0.3246
Non-resident parent	0.0735	0.1121	0.0879	0.1274	-0.0366	0.1279	-0.0807	0.1297
Highest grade completed-- Maternal grandmother								
1-8	0.7371	1.4801	0.8043	1.4045	0.6226	0.3982	0.6309	0.4116
9-11	0.7897	1.4799	0.8748	1.4077	0.6992	0.4000	0.6824	0.4122
12	0.7264	1.4796	0.8048	1.4062	0.7197	0.3988	0.7128	0.4122
13-15	0.7362	1.4815	0.9198	1.4073	0.6768	0.4196	0.6623	0.4344
16 or more	0.7509	1.4813	0.8337	1.4082	0.6963	0.4279	0.6701	0.4420
Missing	0.9399	1.4824	1.0230	1.4268	0.6869	0.4020	0.7023	0.4139
Number of Observations	4054				2002			

Table 2d: Ever Repeated Grade

Variables	White Youth				Black Youth			
	No Heterogeneity Controls		Heterogeneity Controls		No Heterogeneity Controls		Heterogeneity Controls	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	-1.2485	1.5303	-2.2629	2.6757	-2.3390	1.0634	-4.5673	1.3423
Head Start	0.2829	0.0970	-0.4316	0.2273	0.2736	0.0715	0.3223	0.0970
Child Care	0.0560	0.0607	-0.0058	0.1379	-0.1022	0.0752	-2.2146	0.4806
Characteristics of Youth								
Age (in months)	0.0112	0.0017	0.0163	0.0029	0.0150	0.0021	0.0161	0.0026
Male	0.3248	0.0593	0.4615	0.0896	0.3746	0.0727	0.4267	0.0897
First Born	-0.0308	0.0621	-0.0119	0.0903	0.1095	0.0798	0.2554	0.1003
HH Income	-0.1746	0.0418	-0.2774	0.0624	-0.1695	0.0409	-0.0523	0.0513
Missing HH Income	-1.8188	0.4480	-2.8707	0.6632	-1.7078	0.4089	-0.5788	0.5106
Characteristics of Biological Mother								
# of Siblings	0.0072	0.0137	0.0183	0.0197	0.0195	0.0115	0.0383	0.0142
Missing # of Siblings	-0.3364	0.2550	-0.4849	0.3710	0.4713	0.2620	0.5234	0.3186
Height	-0.0040	0.0123	0.0027	0.0179	0.0066	0.0137	-0.0004	0.0166
Missing Height	-0.0213	0.8298	0.6331	1.2307	-0.1289	0.9244	-0.7195	1.1254
Highest Degree Completed-- Biological Mother								
GED	0.0135	0.1304	-0.0102	0.1937	0.0558	0.1581	0.3673	0.1966
High School	-0.4861	0.0977	-0.6991	0.1557	-0.5888	0.0968	-0.3951	0.1162
Associates Degree	-0.4579	0.1265	-0.6607	0.1994	-0.5112	0.1549	-0.3903	0.1935
Bachelors Degree	-0.6785	0.1285	-0.9950	0.2130	-1.0038	0.2203	-0.8494	0.2782
More than Bachelors Degree	-0.6558	0.1738	-0.8439	0.2483	-0.9150	0.3551	-0.8408	0.4611
Missing Highest Degree	-0.5379	0.2093	-0.6694	0.3141	-0.3223	0.1657	-0.7195	0.1996
Relationship of Biological Mother								
No Biological Mother	-0.0346	0.3055	-0.2997	0.4534	0.0170	0.2930	0.3032	0.3648
Spouse of responding parent	-0.2778	0.2858	-0.5719	0.4267	-0.0681	0.3571	0.0287	0.4624
Non-resident parent	0.1792	0.1283	0.2867	0.1764	0.0980	0.1422	-0.0354	0.1666
Highest grade completed-- Maternal grandmother								
1-8	0.3704	1.1940	0.3610	2.2530	0.3874	0.3536	0.6661	0.4394
9-11	0.3574	1.1942	0.3970	2.2539	0.2894	0.3558	0.5686	0.4439
12	0.2749	1.1933	0.2265	2.5575	0.2970	0.3547	0.5775	0.4410
13-15	0.2003	1.1982	0.1450	2.8985	0.3946	0.3791	1.0451	0.4833
16 or more	0.1027	1.1973	-0.0286	2.2559	-0.3256	0.4969	-0.0648	0.6117
Missing	0.5950	1.1952	0.6990	2.2529	0.3146	0.3583	0.5676	0.4459
Number of Observations	4011				1977			

Table 2e: Score on PIAT-Math

Variables	White Youth				Black Youth			
	No Heterogeneity Controls		*Heterogeneity Controls*		*No Heterogeneity Controls*		*Heterogeneity Controls*	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	100.7350	11.9414	125.0936	8.5226	96.7536	15.9947	119.7244	16.1063
Head Start	-4.8707	1.1899	0.7494	1.0271	-1.5604	1.0134	-3.5622	1.2731
Child Care	-0.7185	0.6736	-0.0832	0.6293	1.5400	1.0635	20.9224	2.2971
Characteristics of Youth								
Age (in months)	-0.2529	0.0242	-0.2075	0.0173	-0.2334	0.0366	-0.1665	0.0371
Male	0.7854	0.6666	0.4193	0.4199	-0.7191	1.0162	-0.3894	1.0115
First Born	1.6043	0.7012	0.8873	0.4484	-1.0535	1.1072	-2.3934	1.1216
HH Income	2.3020	0.4731	1.2057	0.2627	2.6214	0.5854	0.3639	0.6008
Missing HH Income	24.0522	5.1285	12.7459	2.8723	26.3717	5.7957	4.2459	5.9703
Characteristics of Biological Mother								
# of Siblings	0.1409	0.1514	0.1457	0.0981	-0.4173	0.1697	-0.4660	0.1691
Missing # of Siblings	-0.1107	3.0860	3.2275	2.3219	-3.8549	5.4135	-2.1661	5.0596
Height	0.1764	0.1358	0.1702	0.0889	0.0536	0.1878	0.1975	0.1880
Missing Height	12.9943	9.3675	10.6497	6.2286	-0.5603	13.2070	9.2042	13.0492
Highest Degree Completed--Biological Mother								
GED	2.7104	1.6399	1.0523	1.0321	2.7416	2.1612	0.2701	2.2993
High School	7.9964	1.1754	4.5277	0.7221	2.7791	1.2730	0.1039	1.4210
Associates Degree	11.0830	1.5041	5.5089	0.9512	8.5401	2.2840	6.2765	2.3625
Bachelors Degree	13.8321	1.4828	7.4490	0.9304	13.6094	2.4905	8.8788	2.5465
More than Bachelors Degree	14.3702	1.8286	8.1269	1.1489	17.1110	4.7878	14.8660	4.7625
Missing Highest Degree	10.9918	2.5841	4.1297	1.4402	9.0382	5.1900	4.2063	2.4601
Relationship of Biological Mother								
No Biological Mother	4.1541	3.6492	4.7952	2.2781	8.6882	5.0950	4.5050	4.7373
Spouse of responding parent	-1.3826	3.5444	0.8641	2.5572	9.1631	6.3887	9.0728	6.0145
Non-resident parent	0.2453	1.5105	0.7359	0.9674	-1.4600	1.9832	-0.2008	2.0688
Highest grade completed--Maternal grandmother								
1-8	-1.5282	4.3681	-3.3629	4.9941	1.9122	6.4066	-3.6536	7.1107
9-11	-0.1554	4.3733	-2.5836	5.0118	3.1637	6.42247	-2.4941	7.1459
12	0.5428	4.3001	-2.0129	4.9738	1.1832	6.3982	-3.9127	7.1057
13-15	1.9986	4.4308	-1.2849	4.7993	0.1218	6.66619	-8.5262	7.3589
16 or more	2.2739	4.4111	-1.3890	5.0189	1.4845	6.9191	-6.1571	6.4991
Missing	-3.6183	4.5110	-5.9541	5.0374	3.6041	6.4037	-1.3429	7.1217
Number of Observations	2751				1405			

TABLE 3: RESULTS FROM HEAD START EQUATION

	White Youth		Black Youth	
Variables	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	1.9145	1.9519	1.9413	1.1067
Number of Head Start Classes	-0.0136	0.0333	0.0214	0.0289
Average expenditure per HS participant	0.4176	0.4118	-0.2060	0.3793
Hard Times—age 3	0.5229	0.4665	-0.9115	0.5042
Hard Times—age 4	0.5080	0.4130	0.0839	0.4277
Hard Times—age 5	0.0946	0.4222	0.7921	0.4022
Characteristics of Youth				
Male	0.1359	0.0771	-0.0549	0.0649
First Born	0.0548	0.0793	-0.1078	0.0716
HH Income	-0.4213	0.0580	-0.1462	0.0380
Missing HH Income	-4.4347	0.6066	-1.5291	0.3817
Characteristics of Biological Mother				
# of Siblings	0.0566	0.0160	0.0272	0.0103
Missing # of Siblings	0.2128	0.3492	0.3169	0.2740
Height	-0.0021	0.0140	-0.0080	0.0124
Missing Height	0.3103	0.9554	-0.4890	0.8503
Highest Degree Completed--Biological Mother				
GED	-0.2414	0.1575	-0.2550	0.1581
High School	-0.4831	0.1177	-0.1258	0.0891
Associates Degree	-0.4196	0.1624	-0.1421	0.1407
Bachelors Degree	-0.7888	0.1657	-0.8645	0.1753
More than Bachelors Degree	-0.9785	0.3098	-1.0241	0.3325
Missing Highest Degree	-0.2566	0.2441	-0.4025	0.1691
Relationship of Biological Mother				
No Biological Mother	-0.9700	0.4523	-0.1773	0.3059
Spouse of responding parent	-0.6983	0.3934	0.1158	0.3221
Non-resident parent	0.0996	0.1640	-0.0578	0.1315
Highest grade completed--Maternal grandmother				
1-8	0.0563	1.4080	0.1909	0.3138
9-11	0.2013	1.4101	0.1875	0.3156
12	0.0772	1.4071	0.1006	0.3141
13-15	-0.0618	1.4119	0.0346	0.3335
16 or more	0.1562	1.4126	-0.3730	0.3819
Missing	-0.0127	1.4139	-0.0200	0.3187
Number of Observations	4066		2020	

TABLE 4: RESULTS FROM CHILD CARE EQUATION

Variables	White Youth		Black Youth	
	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	-6.6730	1.8137	-32.7860	151.8412
Average Cost of Child Care	-0.2909	0.2589	0.6952	1.2503
Average Earning of Women	0.1961	0.0746	0.1010	0.3641
Characteristics of Youth				
Male	-0.0152	0.0440	-0.1423	0.2239
First Born	0.3285	0.0474	0.8140	0.2513
HH Income	0.0681	0.0323	1.3327	0.2565
Missing HH Income	0.5938	0.3535	13.1187	2.6105
Characteristics of Biological Mother				
# of Siblings	-0.0020	0.0101	0.0864	0.3074
Missing # of Siblings	0.2933	0.2025	-2.2906	2.0090
Height	0.0146	0.0091	-0.0281	0.0448
Missing Height	0.5706	0.6246	-3.4999	3.3901
Highest Degree Completed-- Biological Mother				
GED	0.2324	0.1217	3.4681	1.0638
High School	0.3326	0.0867	3.6797	0.9373
Associates Degree	0.5013	0.1073	3.8958	0.9839
Bachelors Degree	0.4367	0.1022	3.9168	1.0159
More than Bachelors Degree	0.7828	0.1257	3.6804	1.4156
Missing Highest Degree	0.3064	0.1635	0.8767	0.8962
Relationship of Biological Mother				
No Biological Mother	0.1248	0.2614	5.0736	2.0971
Spouse of responding parent	0.2829	0.2262	1.4820	1.9116
Non-resident parent	0.0646	0.1138	-1.1598	0.4784
Highest grade completed-- Maternal grandmother				
1-8	-0.2887	0.7257	1.7709	1.3644
9-11	-0.2885	0.7280	1.6621	1.3641
12	-0.2408	0.7265	1.8664	1.3581
13-15	-0.2372	0.7300	4.4769	1.6329
16 or more	-0.3446	0.7296	4.3110	1.7601
Missing	-0.2995	0.7098	1.5081	1.3586
Number of Observations	4102		2064	

TABLE 5: RESULTS FROM PARENT INTERVIEW EQUATION

Variables	White Youth		Black Youth	
	Coefficient	Std. Error	Coefficient	Std. Error
Intercept	54.0594	12.8405	34.2415	4.9196
Characteristics of Youth				
Age	-0.0035	0.0049	0.0012	0.0039
Male	-0.0263	0.1435	-0.0316	0.1053
Interview Month	-0.2852	0.0640	-0.1525	0.0215
Characteristics of Household				
Biomom—household roster	1.0700	0.7084	0.7649	0.4164
Biomom—nonresident roster	1.0190	0.7215	0.7232	0.4181
# of Parent figures in household—1	7.7353	3.1786	0.3681	0.4992
# of Parent figures in household—2	7.4983	3.1634	0.2414	0.5094
# of Parent figures in household—3+	7.6315	3.2075	0.2224	0.5628
# of youth in household—2	0.1358	0.2526	0.9401	0.2129
# of youth in household—3+	0.1366	0.2497	0.8444	0.1989
Highest Degree Completed--Biological Mother				
GED	0.5143	0.3812	-0.1156	0.2432
High School	0.6133	0.2907	0.0411	0.1360
Associates Degree	1.3306	0.3949	0.6136	0.2242
Bachelors Degree	1.3021	0.3794	0.3625	0.2487
More than Bachelors Degree	0.5312	0.4187	0.3010	0.4544
Missing Highest Degree	0.1591	0.4437	-0.3102	0.2180
Number of Observations	4471		2334	